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DESCRIPTION OF THE PREPARATORY STAGES OF COENONYMPHA AMPELOS, EDW.

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Egg.—Conical, truncated, the top nearly flat, slightly depressed, covered with a fine network of irregular six-sided meshes ; these form four rings about the central rosette, in middle of which is the micropyle ; the lower part and base rounded and thickly covered with shallow indentations ; the sides ribbed, the number of ribs about 34, vertical, slightly sinuous, more so at lower end, narrow, with rounded spaces between, which are crossed by many fine lines ; color yellow-green. Duration of this stage about 12 days. The egg is like that of *Galactinus*, but has fewer ribs.

YOUNG LARVA.—Length, at 24 hours from egg, .11 inch ; cylindrical ; thickest at 2 to 4, tapering on dorsum and sides to 13, ending in two short, conical tails, which meet at base ; color pale yellow-green ; a mid-dorsal reddish line, and three similar lines on the side, the upper one sub-dorsal, the lowest running with the spiracles, and the middle one nearer the lowest ; surface covered with fine white tubercles, which give appressed downy hairs ; among these are white clubbed processes, all bent back, except those on 2 ; these form three rows on each side, one sub-dorsal, a mid-lateral, with a demi-row on 2 to 4 between the long rows ; in all these one process to the segment ; the third row is at base, over feet and legs, two processes on each, from 5 to 11 ; one each on 3 and 4 ; on 2, 12, 13 two hairs to each, in place of processes ; these lower processes are smaller, and turned down ; head one half broader than 2, rounded, narrowing toward top, a little depressed, granulated ; over the face a few white tubercles with processes as on body, bent down ; color pink-brown. Duration of this stage about six days.

The young larva is in all respects like *Galactinus*, except slight differences in coloration.

After First Moult.—Length, at 18 hours from moult, .2 inch ; nearly same shape ; color yellow-green ; surface thickly beset with white tubercles, and downy ; a mid-dorsal green line, three similar ones on side, the two lower nearest together, the lowest being next over the basal ridge,

which is light yellow ; ends of tails pink ; under side, feet and legs green ; head sub-globose, depressed at top, the surface much covered with white tubercles and hairs ; color green. Duration of this stage about 11 days.

After Second Moult.—Length, at 24 hours, .3 inch ; shape as before ; color more green than yellow ; dotted as before with white tubercles ; tails rough with tuberculations, reddish ; stripes as at last previous stage, the two lateral less distinct ; the basal ridge yellow ; head emerald, tubercles as before. To next moult 6 days.

After Third Moult.—Length at 24 hours, .42 inch ; in six days, one larva of the brood was full grown.

MATURE LARVA.—Length .7 inch ; cylindrical, a little thickest anteriorly, dorsum and sides sloping very gradually, the former to 10 and then rounding to 13, ending in two conical, short, stout tails, which meet at base, and are rough with tuberculations ; whole surface covered thickly with fine rounded white tubercles, each of which gives out a fine short hair, making a downy coating ; these hairs are clubbed, or tapering, or cylindrical ; color dark green, the sides yellow-green ; the tails reddish ; a mid-dorsal darker green stripe ; on the sides traces of two stripes (the sub-dorsal having disappeared) ; the basal ridge light yellow ; under side, feet and legs green ; head broader than 2, sub-globose, a little depressed, beset with white tubercles and hairs, the surface finely granulated ; color yellow-green, the principal ocellus emerald in brown ring. From third moult to pupation 10 days.

After Fourth Moult, after hibernation.—Length .49 inch ; not differing in color or markings from third summer moult.

CHRYsalis.—Length .4 inch ; greatest breadth, at mesonotum, .12, at abdomen, .14 inch ; shape of *Galactinus* ; cylindrical, stout, the upper end truncated, the abdomen swollen, conical at extremity ; head case narrow, ending in a sharp cross ridge which is a little arched, the sides excavated roundly ; mesonotum prominent, arched, the carina rounded transversely, the sides slightly convex, followed by a shallow depression ; color delicate green ; marked by nine black stripes placed as in *Galactinus* ; of these, one on dorsal edge of each wing case from base to inner angle of wing ; a curved stripe on middle of each wing reaching the hind margin ; a short stripe on same margin on ventral side of the curved one ; two short stripes on the antennae cases ; besides these, there is a black mark on either side of 13 ; top of head case whitish. Duration of this stage

10 days. Whole period from laying of egg to imago, in summer, 49 days, of which the egg was 12 to 13, larva 25 to 26, chrysalis 10.

After the second and third moult, which took place last of June and early in July, all the larvae but the one which went to pupation 30th June, became lethargic, and evidently would hibernate. I put four of these on ice, 26th July, and nine others, 4th August, to see if some weeks of that treatment would not serve for their resting period as well as the entire winter, with ordinary exposure. On 23rd August, I brought in one of the first lot, on ice four weeks. This had passed three moults. On 24th, it began to eat; on 26th, was .48 inch long; grew slowly and eat at long intervals. By 20th Nov., was .56 inch; and passed the fourth moult 2nd December. On 30th Dec., pupated. The pupa I put in alcohol. Another larva passed 4th moult, 6th January. Another same, 17th February. This last pupated 23rd May, and gave imago 3rd June. So that the exposure on ice, though it more or less fully aroused the larvae, does not seem to have shortened the hibernating period, except in case of the single one which pupated 30th December.

The eggs of *Ampelos* were sent me by Mr. James Fletcher, then at Victoria, V. I., and were laid 22nd May, mailed 23rd, and reached me 3rd June. The first larva hatched 4th June.

On 21st June, I received a second lot, or rather, young larvae just hatched, and two eggs. These were laid on 9th and 10th June, and were mailed 11th. In both cases the females which laid the eggs were sent.

There seems to be no dimorphism in this species. The butterflies which came from chrysalis with me did not differ from the parents, and examples sent, taken in May and in August, were of the one type. Mr. Fletcher informs me that this was his experience. This species is of the size of *C. Ochracea* (smaller than *Galactinus*), of a paler color; the under side of hind wings gray brown, sometimes paler beyond disk, sometimes of one shade from base to margin; with an interrupted, irregularly crenated band across disk; with no other mark, no spot towards base, no ocelli or spots along hind margin (all these spots are characteristic of *C. Ochracea*). Mr. Fletcher writes: "I have never succeeded in finding an ocellus, and I am sure I have examined hundreds of examples." He also adds that the species is extremely abundant at Victoria.

Ampelos was described by me, 1871, in Tr. Am. Ent. Soc., from a pair received from Oregon. So that it probably is found at least from Oregon

to Victoria, and also probably west of the Cascade Mountains. I have not seen it from California, or other region.

The larvae of this genus are exceedingly sluggish, in confinement resting on the grass stems or leaves, and scarcely moving except when the supply of food fails. They are easily bred. I am now feeding larvae of *C. Ochracea*, and will in due time give report of it. I wish some one in the North-west, interested in these things, would send me eggs of *C. Inornata*, a dark brown, or brown-ochre species, with black-brown under side, found along the northern boundary of the U. S. in Dacotah, and in Brit. Am., on the prairies. Eggs can readily be had by confining females over grass in box or fruit can.

NOTE.—In my paper on the stages of *C. Galactinus*, vol. xviii., p. 201, the measurement of the mature larva should read .84 inch (not 1.06 inch).

ON THE GENUS RICHIA.

BY A. R. GROTE, BREMEN, GERMANY.

After examining the European *Ammoconia caecimacula* (in which the ♂ antennae are dentate and furnished with pencilled setae or hair; the form stout; the tibiae, of the middle and hind legs only, spinose; the thorax and abdomen with slight dorsal tuftings), I find that my species are not congeneric, and I accordingly refer them to this genus named in memory of a Brooklyn Entomologist, Harvey J. Rich, who died while yet young, and whom I knew "before the war." The type of *Richia* is *Chortalis*, and its probable dimorphic form *Aratrix*, though we do not know quite surely whether the two are so related or not; they occur over the West and Southwest, to Texas. A second species is the Texan *R. sculptilis* of Harvey, a fine Noctuid. A third is my *Decipiens*, with its red form *Parentalis*, figured in my Essay. These differ by the untufted abdomen, spinose, fore tibiae, the thorax having a ridge of hair (well shown in my figure, Plate 1, 13), as also by less robust form, agreeing with *Agrotis*. The genus, in fact, is not a Hadenoid form, and I refer to my paper on *Agrotis*, CAN. ENTOM., xv., 54, for my views as to its position.

I remember determining a fourth species from the West, and others doubtless will be found. At present I would thus arrange them:

Genus *Richia* Grote.

Chortalis Harvey.

dim. var. aratrix Harv.

sculptilis Harvey.

decipiens Grote.

var. parentalis Grote.

LIMOCHORES PONTIAC AND ATRYTONE KUMSKAKA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

In 1863, Mr. W. H. Edwards described a male *Hesperia Pontiac* from Michigan under the name of *Hesperia Pontiac*, closely resembling the species figured by Boisduval and LeConte, under the name of *Arpa*, as well as the larger Florida species Edwards subsequently described under the name of *Pilatka*. In the same paper in which *Pontiac* was described and immediately preceding it, he described, also from Michigan, a female under the name of *Hesperia conspicua*. These two forms were subsequently figured in the same volume (II.) of Proceedings of the Entomological Society of Philadelphia, and were recognized as the male and female of the same species, after Prof. H. W. Parker had re-described the male (Can. Ent., III., 51), referring it to *H. conspicua*. In his since published lists, Mr. Edwards has classed them as one species under the preferred name of *Pontiac*.

In connection herewith I have made two mistakes: First, in identifying in 1868 an Iowa species as *conspicua* and describing the proper male of the same as the then supposed unknown male of *conspicua* (Trans. Chicago Acad., I., 336); and second, the re-description, very briefly, of *Pontiac* under the name of *Hedone Orono* (Syst. Rev. Am. Butt., 58), being led astray by my supposition with regard to the Iowa butterfly. I have since given the Iowa butterfly, which belongs to *Atrytone*, the name *Kumskaka*, in naming it for others; but as this name has not been published, nor the species fully described, I append herewith a full description of the same.

The two butterflies concerned belong to two different genera, one of which (*Limochores*, to which, and not to *Hedone*, *Pontiac* belongs,) has a sexual, velvety dash or stigma on the front wings of the male, wholly wanting in *Atrytone*, and they can thus be readily distinguished.

ATRYTONE KUMSKAKA.

Hesperia conspicua, Scudd. nec. Edw.

Head covered above with mingled greenish-yellow and blackish hairs, the former in excess; on the inner and outer side of the bases of the antennae a tuft of black hairs; encircling the hinder part of the eye a series of pale yellow scales; palpi pale yellow, with a very slight greenish tint, shading into pale orange toward the tip and there interspersed with a

few black scales, which on the upper surface supersede the others; last joint black; antennæ black, annulated broadly below, narrowly above, at the base of each joint with glossy, pale lemon-yellow scales, which on the base of the stem are merged into a common bright patch; club, excepting as just stated, black; the crook dull castaneous to the very tip.

Thorax covered above with mingled greenish-yellow and brownish hairs, the brighter ones more conspicuous on the prothorax and patagia than elsewhere; beneath covered with pale yellowish hairs, mingled with dusky ones. Femora pale yellow, whitish above, the inside of the middle and hind pair dusky; tibiae and tarsi dull orange, becoming dusky above, especially at the tips of the tarsal joints and increasingly so toward the tips of the legs; spurs pale orange, tipped minutely with testaceous; spines testaceous; spurs reddish; pad dusky.

Wings above tawny, exceedingly broadly bordered with dark brown, particularly in the female, where the tawny is reduced to a comparatively narrow interrupted band. Fore wings with the outer margin broadly bordered with dark brown, the interior margin of the border passing from the tip of the costal nervure on the costal margin in a bent, slightly curved, pretty regular line to the middle of the outer two-thirds of the submedian nervure, and passing midway between the apex of the cell and the outer margin of the wing; the inner margin is similarly bordered with dark brown as far as the submedian nervure; the costal edge is blackish, and within these encompassing borders the veins are distinctly marked with dark brown; besides which the outer limit of the cell and the outer half or two-thirds of the upper limit are rather broadly bordered externally with blackish, which often reaches to the costal border; besides, the basal third of the wing, and especially the part lying below the middle of the cell, is heavily begrimed with brownish scales, most conspicuously next the nervures; and all these latter markings are so blended in the female that no tawny color whatever is left but a small quadrate spot (often obsolete) at the tip of the cell, and a transverse, nearly equal, strongly curving or bent band next the outer bordering, about as broad as the width of the cell; this is indeed most frequently reduced to a series of 7 or 8 unequal longitudinal spots, forming a bent series lying farther removed from the outer margin, the upper portion starting from the middle of the outer half of the costal margin and directed toward a

point scarcely below the middle of the outer margin ; the other part of it is directed at right angles to the upper portion. Fringe dull brown, sometimes tinged with tawny, paling externally.

Hind wings so broadly bordered as best to be described as dark brown, with the central parts tawny ; in the male consisting of a roundish patch cut by the nervures delicately traced in brown, extending nearest to the outer border (a little more than an interspace distance from it) on the lower subcostal nervure, and occupying the space between this and the tip of the cell, and reaching from the lowest median nervure to the middle of the subcostal interspace ; within the cell is an obscure tawny patch, and the medio-submedian interspace is obscured by some tawny hairs. In the female the fulvous colors are reduced to a series of longitudinal streaks, separated by broadly marked nervures, occupying the same place as the large patch of the male, but reduced in breadth. Fringe pale dull fulvous, the basal half brownish.

Beneath the markings are much the same, though scarcely so intense as above, and on the hind wings of the male very much obscured ; the tawny on both wings has become a dull lemon yellow, sometimes in the female rather pale, and the brown, excepting in the lower half of the fore wings, where it has turned to blackish fuliginous, has become obscure tawny brown, in the female tinged with fuliginous ; in the brighter portions the nervures are rather narrowly marked with tawny or brownish tawny, in the darker parts very faintly with yellowish or brownish yellow ; the tip of the cell in the fore wings of the male, and sometimes in those of the female, is marked with an oblique blackish streak, and at the tip of the cell of the hind wings of the male is a small obscure blackish spot next the nervure at either side. Fringe dusky, tipped with pale, more broadly below than above.

Abdominal appendages of *Atrytone Kumshaka*, male, viewed laterally ; the lower partial figure shows the clasp as seen from beneath.



Abdomen black, the sides, especially on apical half, largely tinged with fulvous ; beneath pale yellowish, becoming tinged slightly with greenish toward the tip. The appendages of the male are shown on a side view in the accompanying sketch. The upper organ is very strongly arched,

almost bent in the middle, beyond which the heaviest part is found; this is not large but gibbous, transversely convex, and directed downward, the hooks straight, with a scarcely perceptible separation, together continuing the taper of the centruum, stout and very blunt and heavy at tip, where it is scarcely arched; lateral arms stout, curving upward and inward at tip, meeting just beyond the tip of the hooks. Clasp about half as long again as broad; the upper process broad and short, squarely docked, scarcely turned upward, but directed backward, a little incurved, the lower angle sharp, but the upper rounded; above this the posterior margin of the clasp retreats a little, and bears in the middle a broad and short truncate tooth, overhung by the upper process, the base of which is curved over so as to be horizontal, is similar to the lower process, but bears at its lower extremity a long, equal, slightly depressed, incurving finger, nearly half as long as the breadth of the clasp, its bluntly pointed tip touching the extremity of the upper organ.

Length of fore-wing, male 15.75-16.25 m.m., female 17.-17.5 m.m.; of antennæ, male 7.75-8.4 m.m., female 7.8-8.1 m.m.; of hind tibiæ and tarsi, male and female 7.75-8 m.m.; of fore tibiæ and tarsi, male 4.9-5.15 m.m., female 5.25-5.3 m.m.

Described from two males and three females from the Western States.

PREPARATORY STAGES OF APATELA FELINA, GROTE.

BY G. H. FRENCH, CARBONDALE, ILL.

YOUNG LARVA.—Length .10 inch; body cylindrical; head broader than the body, oblique. Color of the upper part and sides of joints 2, 4, 5, 7, 8, 9, 12 and 13, reddish purple; the rest of the upper part and sides and the venter dull whitish; six rows of tubercles from which proceed small clusters of brown hairs, the four rows of dorsal clusters longer than the body; head black; feet purplish. Duration of this period, 4 days.

After First Moult:—Length .22 inch; shape about as before. The joints that were reddish purple during first stage are now black, the others white, the tubercles small, black; head black; hairs from the dorsal tubercles dark gray, the others white. Duration of this period, 3 days.

After Second Moult:—Length .35 inch. Color of the upper part

black and creamy white ; under part grayish brown, with two pretty well defined streaks of this color on the white part of the sides. The colors above are as follows : Joints 2 to 5 black, 6 white, 7 to 10 black, 11 white, 12 black, and the terminus of 13 black ; a fine dorsal line of clear white ; the tubercles the same as before, each bearing a cluster of hairs of various lengths, the longest nearly as long as the body ; the two dorsal tufts on joints 5, 7 and 12 with small pencils of short black hairs ; a few black hairs from the tubercles on the other black joints ; the hairs from the tubercles of the white joints clear white, with a few brown hairs intermingled in the dorsal pencils ; head and feet black. Duration of this period, 4 days.

After Third Moulting :—Length .60 inch. On the dorsum are three stripes, a broad gray one in the middle, in the centre of which is a fine white line, and each side of this stripe a whitish stripe ; below this most of the side is pale yellow ; the whole strongly tinged with green. The tubercles bear thick clusters of short spreading hairs ; the dorsals on joints 5, 7, 8 and 12 black, with a few black ones in some of the others, but most of the rest of dorsal hairs white ; those from the white stripe, white ; those from the yellow stripe, yellow and mostly longer than the others ; a long fringe each side of the body, extending round the posterior extremity. Head and thoracic feet black. Duration of this period, 6 days.

After Fourth Moulting :—Length 1 inch when at rest. Color of body yellowish green, with a gray dorsal stripe ; under parts grayish brown ; the whole body covered with fine yellow hairs that spring from the general surface as well as from the tubercles ; the tubercles or piliferous spots scarcely distinguishable from the general surface save that from these the hairs are more in clusters ; a few black hairs in place of the former black pencils. Head black, the front with the usual pale inverted Y ; the sides mottled with black and pale brown. Duration of this period from 4 to 5 days.

Mature Larva :—Length when crawling 1.60 inches ; when at rest 1.40 inches. Characters the same as at the beginning of the period.

Chrysalis :—Length .80 inch ; to end of wing cases .40, these extending almost to the posterior part of joint 5 ; depth from .21 to .22 inch ; cylindrical, tapering gradually from joint 5 back, the tongue case extending only to the anterior part of joint 5 ; the anterior part of abdominal

joints finely punctured; head rounded; wing cases slightly wrinkled. Color, mahogany brown, the wing cases and other anterior parts darker. Cremaster a series of short hooks extending out laterally, fastened into the lining of the thin cocoon. Duration of this period from 269 to 275 days.

The eggs from which the larvae upon which the above observations were made were received from Mr. C. F. McGlashan, of Truckee, California. They were deposited July 6th, 1885, reaching me the 12th, just as the young larvae emerged from them. This gives the egg period 6 days. This would give us a total from the egg to the moth of 296 days. This would give ample time for a second brood, as from the egg to pupation only consumed 27 days of the 296, and add to that 14 days, the usual pupal period of a great many of our moths. But it is quite probable that in its home in the Sierras these periods would be considerably lengthened out, so that the moth would not emerge from the chrysalids till some time in June, instead of from the 2nd to the 6th of May, as these did, as it is generally known that heat accelerates the growth of insects, and that cold retards the same. In the case of *Leptarctia Lena*, I find an exception to this general law, however.

The food plant of this insect is willow. In pupating, the larva fastened its cocoon closely against the side of the box (made of soft pine), some of the fibre of the unplanned board being woven into the outer part of the cocoon. The cocoon was thin, firm and tough.

NOTES ON SPECIES OF LEPIDOPTERA.

BY AUG. R. GROTE, A. M., BREMEN, GERMANY.

A. Observations on the Larvae of certain Bombyces.

1. *Dryopteris rosea* Walk.

The full grown larvae, in the beginning of July, feeding on *Viburnum acerifolium*, the "Maple-leaved Arrow-wood," * are, in their last stage, olivaceous brown, pale dorsally; dorsal line single, dark; a triangular

* The plant was determined for me by Mr. A. Pettingill, to whom I am indebted for more specimens.

dark patch on each side of the body commencing on segment 4 (I do not count the head) and bordered above the abdominal feet with pinkish ; anal segment prolonged. Similar anal prolongations occur in the larvæ of other genera of this sub-family, and a resemblance to *Cerura*, where it is furcate, throws light on the relationship of these moths. In resting, the terminal segment is slightly elevated. A fleshy protuberance on the dorsal line on third segment. Pupation in a light, close web of pale brown silk, between the leaves (July 6-8). Coloration protective, concealing the larva as it rests on the stem of the leaf. The spotting of the "tail" with pale is part of the protective coloration. After three weeks in the pupa the moth appears. Now that the whole history of *Dryopteris* is known, it is seen that in the structure of the larva and its habit it closely agrees with the other genera of the sub-family. It is probably double-brooded, the pupae of the second brood hibernating. An ally of this genus is described by Walker from Japan ; whether the genera are distinct I cannot say. Walker does not even compare them, calling our moth a *Drepana*, while Herrich-Schaeffer calls it a *Ciliix*. We have two species of *Dryopteris*; the larva of the second, *irrorata* Pack., is unknown to me.

In the few descriptions of larvae which I have drawn up, I commence the numerical series with the first prothoracic segment ; it seems to me quite wrong to commence with the head, which must be described separately. Thorax 1-3; abdomen 4-12.

2. *Anisota stigma* Fab.

The larvæ on oak in July are in their last stage, light leather brown, a sub-dorsal row of stout black spinules, an infra-stigmal series all commencing on segment 2, which is provided with a pair of long black spines curved backwards ; the skin is dotted over with white, especially on the segments anteriorly and beneath ; a dorsal series of spinules, of which the one on 12 is stoutest ; two on anal segment. There is a fore and aft symmetry in the disposition of these spinules, which must be looked upon as defensive in their nature. This caterpillar differs generically from that of *Sphingicampa bicolor* and *S. bisecta*. There is no doubt that we have two genera, but whether this last genus should not be called *Adelocephala* of Boisd., I cannot decide without South American types to compare. Enters the ground to pupate ; a resemblance can be shown between all these larvæ, *Citheronia*, *Eacles*, *Anisota*, a progressive development of the

spinules into fleshy horns; by the development of the twelfth segment and its spine, an approach to the *Sphingidae* is signalized, which the form of the moth somewhat confirms no less than the mode of pupation. I do not regard the *Sphingidae* as related either to *Cossus* or *Hepialus*, but to the Ceratocampians (*Saturniade* in part) and *Notodontina*. As we shall see further on, there is a succession of development of the spines from *Dryocampa*, where they are merely present anteriorly and posteriorly and the body is naked, to *Citheronia*, where they are fleshy, long, exaggerated and complicated. I have not at this writing all the necessary material before me, but I have been interested in describing and figuring the simplest forms in this group of larvæ, and in showing that there is so great a difference and development of larval armature within this one group that we may use it as a guide in arranging the genera, of which *Eacles* would seem to be the highest in the series.

3. *Anisota virginiensis* Drury.

Already, as in the moth, the larva shows an approach to *Dryocampa* by the lessening of the armature. Taken on oak at the same time, this larva has the infra-stigmatal line of spinules weaker, as also the sub-dorsal series which rest on the reddish sub-dorsal stripe. The anal spinule of the dorsal series is shorter than in *A. stigma*, and this is true of the weaker thoracic horns, which are more bent and arise with a greater slope forwards. The color is obscure greenish, mottled with black; an infra-stigmatal reddish stripe. Stigmata distinct, much as in *D. stigma*. The anal segment has but one small spinule. Enters the ground to pupate.

4. *Dryocampa rubicunda* Fabr.

Larva light green, with longitudinal stripes of a darker shade. The spinules have disappeared and this is evidently the lowest form in the group, the larva commencing to look like that of some of the lower moths. The black horns on segment 2 are retained, as also dorsal spinules on 11 and 12; a pink stripe laterally, the head is discolored; the stigmata concolorous and concealed, not prominent and discolored as in *Anisota*. But the narrower larva is otherwise quite similar. Enters the ground to pupate. On oak, maple, and a number of trees. I regret not to know the larva of var. *alba* Grote, which would be interesting to compare. As the variety is common, it will doubtless soon be described. Hübner, with an eye for the general appearance and structure of moths, calls this group

communiformes; I fancy he meant by this that the moths approached the *Noctuidae* in their proportions, that the body was heavy and longer than the wings. I may be wrong in this. The moths are interesting to me, as I have long ago said, from the curious way in which the pattern of the upper surface of hind wings is reproduced on primaries beneath; this is also the case in the *Noctuidae*. I have said it is as if the pattern of one were photographed on the other; we have an approach to this in the *Smerinthinae*, in which the under side of fore wings is often rosy. This is seen more or less in all moths in which the wings cover each other in a state of rest; therefore not in the *Geometridae*, not in the Butterflies. The *Ceratocampinae*, which Grote and Robinson, in correction of Packard, separate from the Saturnian genera *Hemileuca*, etc., are an American sub-family of *Bombyces*, probably the descendants of an old type more intimately connected with the Hawk Moths. The eye spots of *Smerinthus* are re-called, the rosy disc of the secondaries is here repeated. The group is probably South American in its origin. It has a feeble but beautiful representation in North America.

B. Description of an Unknown Larva belonging to the Geometridæ.

A small colony of nearly full grown larvæ were observed on *Syringa vulgaris*, the common lilac, on September 16th, on Staten Island. The total length extended was then 30 mil. The head was small, the thoracic segments narrowing anteriorly. The two jointed antennæ were provided with a bristle at the extremity of the second joint. Two pair of abdominal or false feet. From the 4th to the 7th segment the body was enlarged and somewhat flattened, the segments provided with a rounded lateral prominence and with a dorsal transverse ridge showing small yellowish points on each side, from the inner edge of which points sprang a single hair. The latter characters were shared by all the abdominal segments. The 7th to the 9th segments showed a pale yellowish lateral patch, below which the ventral protuberance was flecked with the same color extending along the abdominal legs on the latter segment. A more elevated dorsal hump on the anal segment, consisting of two protuberances; from the apex of each is emitted a single short bristle. This seems to recall a stage in the development of the caudal horn of the *Sphingidae*. The whole body seems naked, but two isolated hairs or bristles are seen to arise sub-dorsally along the segments. The head is sparsely hirsute. The general color of this singular larva is dark wood brown, marbled dorsally with a

paler shade. The whole larva looks like a withered leaf. When discovered the little colony were hanging head downwards, supported by the two abdominal feet, and giving themselves a slight swaying motion with the free portion of the body (not unlike that we see in some pendulous pupæ), the resemblance to a dead, half-fastened leaf, preparing to fall with each stronger gust of the autumn wind, was heightened. My attempts to rear the colony were frustrated by their escape, and before a drawing could be made, which I intended. Belonging probably to the *Ennomidae*, these larvae were remarkable for their mimicry of dead leaves. The larvae of the *Geometridæ* are often very interesting from their bizarre forms and singular ornamentation, which, of all the groups of moths known to me, most nearly resembles that of the curious forms among the higher Butterflies.

C. Two Gray Species of *Lithophane*.

For the synonymy of this genus see Grote, Check List, p. 38, 1876. It is called incorrectly *Xylina*, whereas *Xylenea*, Hübner, has for type *Hadena lithoxylea*. These little *Noctuidæ* hibernate in the moth state, inhabiting the north temperate regions. We have a number of species, among which are two purely light gray forms, *L. fagina* Morr., and *L. Georgii* Grote, besides the darker gray and stouter series of *L. antennata* Walk., *L. laticinerea* Grote, and *L. Grotei* Riley (= *cinerosa* Gr., n. b. L.), and which series is considered varietal by Professor Riley, and one of distinct but nearly related species by myself, I first separating and describing them.

Lithophane fagina Morr.

This species differs by the obsolescence of its markings, which gives the primaries a somewhat narrower appearance, and recalls those of *Cucullia*. A white shade, more purely white and more extended than in any other species of the genus, extends along costa to apical third. The customary markings are lost or barely indicated by hair streaks of black scales. The veins are marked finely in black. The series of cuneiform marks forming the subterminal line can be faintly made out on the shining gray concolorous wings; the stigmata are lost; hind wings pale smoky gray with whitish fringes, reflecting the irregular smoky mesial band and thick discal mark from the under surface, which is paler than

above. On the darker fore wings beneath the spot and band are more faintly repeated. Head and thorax concolorous dark smoky gray, paler beneath; abdomen like secondaries. Not rare. Canada to Middle States. Larva unknown. Hibernated specimens are found in April and May; the fresh examples may be taken in October.

Lithophane Georgii Grote.

Differs by its warmer and darker gray color; the pale costal shading of primaries is confined to the shoulder of the wing; the black angulated median shade is diffuse and evident; the veins more evidently black marked; the subterminal line is distinct, and the customary black basal ray is to be plainly seen. Beneath the mesial smoky band on the whitish gray secondaries is wavy, being roundedly indented on the disc, and this character is very evident on comparison, its course being straight without prominent inflection in *L. fagina*. Mrs. Fernald sends me this species from Maine; the type was collected by Mr. George Norman, in Canada.

D. On Parorgyia Clintonii.

This northern form is allied to the southern *leucophaea* of Abbot & Smith, but one or two specimens from Georgia and Alabama were evidently different, or suggested a rather wide variation. The *achatina* of Harris and Packard is not Abbot & Smith's species, but is based on specimens belonging to *Clintonii*. The moth described by Dr. Packard as *Platycerura furcilla*, is apparently related to this group, resembling the European *Dasychira pudibunda*, but of a more compact, noctuid-like form. Its name is a misnomer, as it is in no wise like *Cerura*, where it is placed by my old friend Dr. Packard, in whose monograph, admirable for its arrangement of the groups, the genera with furcate anal extension in the naked larva are brought near the group where the anal extension is undivided, evidently correctly. The larva of *Platycerura* is, however, hairy, as described by Lintner and Thaxter, and resembles the larvae of the *Apatelinae*, where I have placed the genus, I think correctly. None of the European genera examined by me appear identical with *Parorgyia*, which genus seems an extension of *Orgyia*, in which the female is winged and the whole form in both sexes stouter.

NOTES ON THE LOCUSTIDÆ, WITH DESCRIPTION OF A NEW SPECIES.

BY WM. T. DAVIS, STATEN ISLAND, N. Y.

Whether they fill the listener with a train of happy thoughts, as Gilbert White says, or whether they produce a sadness because the days of summer are nearly gone, as Dr. Harris asserts, the songs of crickets and other Orthoptera have, nevertheless, the merit of always being interesting. An insect that can sing—that has something to say—even though it be the same, night after night, enjoys a sort of individuality, and this long discussion of the Katydids and the quiet murmur of the tree crickets, constitute one of the chief charms of our summer evenings. But they do not always sing or stridulate quite alike, and sometimes, too, their shrilling apparatus is slightly deformed or injured, producing some curious sounds when in use.

I once heard a Katydid whose singing apparatus was out of order, and the sounds given forth contrasted strangely with those of a rival male in an adjoining tree. *Amblycorypha retinervis* produces two somewhat different songs, or perhaps more correctly, varies the same song in time or extent of utterance, so that unless the same individual is listened to for some time, the notes might be attributed to different species. This insect often lays its eggs on the honeysuckle, and I once observed a female on the 16th of Sept., ovipositing on a low tree by the road side, gradually biting the bark into a ridge, along which the eggs were laid, tile fashion.

On Staten Island, the first Conocephalus that is heard in the garden is *ensiger*, and with *ik-ik-ik*, as if sharpening a saw, enlivens low bushes and particularly the corn patch. This insect seems to especially delight in perching near the top of a corn-stalk and there giving forth its rather impulsive song. I have often watched one crawl, with many a spiral turn, up the stem, fiddling all the while. My notes on its first heard stridulation show considerable uniformity, and the average date may be taken as July 15th.

Conocephalus dissimilis is more of a low grass and weed loving insect than *C. ensiger*, and also comes later in the season. I have found this insect stridulating when its head was gone, picked off perhaps by some

vagrant chick. The brown colored specimens are much more common in this species than in *ensiger*.

Conocephalus robustus resides for the most part mid the grass on sandy ground near the sea shore, though an occasional individual finds its way inland. Along the sea beach they stridulate in early afternoon, especially if slightly cloudy, and when approached they have a curious fashion of dropping to the ground. I have often found them, on such occasions, actually standing on their heads in the soft sand, leaning against the grass stems which grow so close together, without in any way holding on to them. Whether this position is intentional or not, I cannot say, but certain it is that when looked for from above they offer the smallest extent of their bodies to view and may thus escape many enemies.

I have found another *Conocephalus* on Staten Island, mid the cat-tails that grow on the salt meadows, and a specimen sent to Mr. Samuel H. Scudder was considered by that gentleman to be an undescribed species. This insect keeps very close to the ground, hiding well in the vegetation, and is not easily discovered. The sound produced when stridulating is very faint, not louder than that made by *Gryllus abbrinatus*, and I was much surprised to hear such a faint song come from so large an insect. I have, in consequence of this faint song, named it the "slightly musical" *Conocephalus*.

C. exiliscanorus. A large species, brown or green, the tegmina in the brown specimens irregularly dotted with fuscous spots. Fastigium long, moderately pointed, bent downward at apex, slightly flattened and scabrous above with medial groove or depression, depending tooth at lower base of fastigium pointed. Pronotum scabrous. Tegmina moderately broad and slightly falcate. Hind femora with numerous spines beneath, the other femora with only an occasional abortive spine near tip.

Length of body (including head), 37 m.m.; of fastigium beyond front edge of eyes, 5 m.m.; of pronotal disk, 9 m.m.; of tegmina, 40 m.m.; of hind tibiae, 21 m.m.; 2 ♂.

This insect is allied to *C. ensiger*, but readily distinguished by the longer fastigium, the entire under surface of which, with the exception of the basal fourth, is of a deep shining black.

DISSOSTEIRA CAROLINA.

BY JEROME M'NEILL, MOLINE, ILL.

During the past summer I collected at Dublin, Wayne Co., Ind., a number of *Œdipodini* that seem to be a long-winged variety of the above named species. A comparison of the dimensions given by Thomas and Saussure for *D. carolina* and *D. longipennis* with measurements taken from eleven of these specimens, will show what the difference amounts to. The former, in his *Acrididae* of North America, page 118, gives for *D. carolina* the following dimensions: "Female—Length, 1.5 to 1.75 inches; elytra, length of the body; posterior femora, about half the length of the body. Male—Length, 1 to 1.25 inches; elytra and wings passing the abdomen about one-third their length." The same authority gives for *D. longipennis*: "Length, 1.14 inches; elytra, 1.27 inches; posterior femora, 0.64 inch; posterior tibiae, 0.55 inch." These dimensions are those of the male, the female being unknown to Thomas.

Saussure, in his "Prodromus Edipodiorum," pages 137 and 138, gives for the measurements of the first named species: "Length, female, 40, male, 33; elytra, female, 41, male, 36 mill." And for the last mentioned species: "Length, female, 45, male, 35; elytra, female, 46, male, 35 mill."

It appears from these facts then that while the length of the body is greater in *D. longipennis*, the wings are proportionally longer in both female and male of *D. carolina*, and absolutely longer in the male of this species, so that the latter is, in spite of the name, the long-winged species. But the Dublin specimens exhibit a much greater contrast in the relative lengths of the elytra and bodies, as a glance at the following table will show:—

No. 1, female, length, 34;	elytra, 41;	posterior femora, 17;	posterior tibiae, 14 mill.
No. 2, "	37;	" 40;	" 17;
Average "	35.5;	" 40.5;	" 17;
No. 3, male, length, 27;	elytra, 33;	posterior femora, 14;	posterior tibiae, 12 mill.
No. 4,	28;	" 34;	" 15;
No. 5,	27;	" 33;	" 14;
No. 6,	27;	" 32;	" 15;
No. 7,	30;	" 34;	" 14;
No. 8,	27;	" 33;	" 14;
No. 9,	28;	" 35;	" 15;
No. 10,	26;	" 33;	" 14;
No. 11,	29;	" 34;	" 14;
Average "	27 $\frac{1}{2}$;	" 33 $\frac{1}{2}$;	" 14 $\frac{1}{2}$;
			" 12 $\frac{1}{2}$ "

In the female then the elytra are 1.14 the length of the body, while in the male the elytra are nearly 1.21 the length of the body.

To present this striking difference to the eye then: In the Dublin specimens the ratio of the elytra to the body is, female 1.14, male 1.21; according to Saussure, female 1.02½, male 1.09; according to Thomas, about 1.

These specimens have in several cases the black portion of the wings more or less distinctly fenestrated. This marking is particularly distinct in one specimen on the basal third of the wings. They all have two pale bands on the inside of the femora. The elytra extend beyond the body from .32 to .44 of their length.

NOTE ON THE SAW FLY, HYLOTOMA DULCIARIA, SAY.

BY THE REV. T. W. FYLES, SOUTH QUEBEC.

On page 38 of the February number of last year's ENTOMOLOGIST, is a note, written by myself, concerning an injurious Saw-fly larva which had appeared in abundance in the neighborhood of Quebec. I preserved quite a number of the cocoons of the species, hoping to obtain the perfect insect from them. Some of the cocoons were kept in a box in my study, others in a tin case placed in the cellar, and yet others in a glass jar half filled with moist earth. It was from the last lot only that I met with a successful result. In July last two imagoes presented themselves. The insect in its perfect state is of sluggish habits. Its head and wings are purple; its thorax and abdomen yellow. It is about one inch in expanse of wings. Knowing that Mr. Harrington had given much attention to the Hymenoptera, I brought the insect under his notice, and he was able to identify it as *Hylotoma dulciaria*. The description of the insect given by Norton is as follows:—

H. DULCIARIA.

Hylotoma dulciaria, Say. Long's Second Exp. II., 1824, 314, ♀.
"Pale rufous; head, wings and feet violaceous black." Length 0.34—
0.48. Br. wings 0.74—1.04 inch.

♀. Antennæ black, with a violaceous tinge; nasus emarginate, short; head, a spot on pectus and ovipositor sheaths blue-black, remainder of body testaceous or yellowish-red; legs steel-blue; spines same color;

inner spines rather blunt ; wings violaceous, sub-hyaline, less obscure at apex, a large darker spot below stigma covering marginal and the upper half of all the submarginal cells ; under wings with but one middle cell.

Maine, N. Hampshire, Connecticut, New York, N. W. Ter. (Say), Illinois, English River (Smithsonian Institution).

This is probably the same with *H. pectoralis*, Leach, from which it differs only in the color of the wings and the black ovipositor sheaths, which Say calls the "tail black."

Cat. of the Tenthredinidae and Uroceridae of N. Am., by Edward Norton, from Trans. of Am. Ent. Soc. 1867-9, page 40.

It was not till the first week in August that the insect appeared in its natural haunts. At that time I found, along the St. Louis Road, great numbers of the flies which had been trodden under foot by the passers by. These flies were somewhat larger than those I had succeeded in raising ; but there could be no doubt as to the identity of species. This autumn the larvæ have been again abundant, but not more so, as far as I can judge, than they were last year.

THE COCCIDÆ IN THE MUSEUM OF COMPARATIVE ZOOLOGY, CAMBRIDGE, MASS.

BY DR. H. A. HAGEN,

Having newly arranged the Coccidæ of our collection, which have been named by Prof. J. H. Comstock, I compared them with the Professor's Catalogue for 1883, and ascertained the presence of two-thirds of the 168 numbers enumerated. I find that only 27 N. Amer. species are wanting. Among the insects received in the collection of the Peabody Academy is *Lecanium tiliae*, A. Fitch, from Mt. Carroll, Ill., by Mr. Shimer, very probably identical with A. Fitch's species, and *Lecanium tulipiferae*, Cook, by typical specimens. A certain number is not yet determined, also the later accessions have not been put in the collection. There are some European types of importance. Two of Prof. Ratzeburg's are not published ; *C. variolosus* is believed by Prof. Comstock to be the No. 122, *A. quercicola*, Bouché ; the other is *C. conchatus*, both from the European oak. I am always eager to make the collection of this family more complete. Perhaps it is not out of place to say that the Phytoptocecidia in the collection has been enlarged by European and American species.

